PATENT

INSTITUT FRANÇAIS DU PETROLE

METHOD OF CONSTRAINING A HETEROGENEOUS PERMEABILITY

FIELD REPRESENTING AN UNDERGROUND RESERVOIR

BY DYNAMIC DATA

Inventors : Mickaële LE RAVALEC-DUPIN and Darryl FENWICK

ABSTRACT

- Method of constraining a stochastic model of Gaussian or related type, representing a porous medium such as an underground reservoir, to data characteristic of the displacement of the fluids.

- The method is based on an iterative development in two stages. The first one consists in carrying out a flow simulation, in identifying zones inside the reservoir and in estimating the modification to be brought to the effective permeabilities of these zones so as to improve calibration between the real data and the corresponding responses obtained with the flow simulator. The second stage involves an intermediate optimization problem intended to minimize an intermediate objective function (implemented from a gradual deformation technique) measuring the difference between the effective permeabilities calculated for the zones and the effective permeabilities identified during the first stage for better calibration. This intermediate optimization allows to propagate the desired modification at the level of the effective permeabilities of the zones to the absolute permeabilities of the whole of the reservoir grid cells. It is possible, during the second stage, to disturb several times the reservoir model without having to carry out flow simulation.

- Applications : notably oil reservoirs development for example.